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ABSTRACT

The 1980s have been a period during which important private experiments with innovations have occurred in employee participation, work redesign, and the introduction of new technologies and new systems of production. It is now time to move beyond the experimental stage. The following four interrelated policy initiatives should guide public efforts to promote diffusion and institutionalization of workplace innovations: (1) establish a national database for measuring the diffusion of innovative practices and evaluating their economic and social consequences; (2) update labor law to remove the barriers to labor-management cooperation and innovations; (3) integrate support for workplace innovations with broader human resource, labor market, and economic policies; and (4) provide the political leadership needed to produce a positive climate within which innovative labor management relations can flourish. These initiatives are necessary because there is no reliable estimate of the extent to which employee participation or work redesign principles have diffused across the U.S. work force; growing evidence indicates that current law is undermining workers' and union representatives' confidence in the fairness of the law and heightening labor-management tensions; and diffusion is not likely to occur without strong national leadership and the commitment of financial resources to build support for the innovations. (77 references) (CML)

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35a. EMPLOYEE PARTICIPATION, WORK REDESIGN AND NEW TECHNOLOGY: IMPLICATIONS FOR PUBLIC POLICY IN THE 1990s

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INTRODUCTION

Innovations in workplace practices have surfaced as salient issues at various times in the history of industrial relations in the United States. The 1980s have been such a period with important innovations occurring in employee participation, work redesign, and the introduction of new technologies and new systems of production. The purpose of this paper is to review and evaluate these recent innovations and to examine their implications for public policy.

We start by reviewing the piecemeal evidence available on the extent of innovation in employee participation, work redesign, and new technology that has occurred to date and summarize the theoretical arguments that explain their current interest. Then we put these current innovations in their historical and theoretical context by reviewing briefly the lessons learned from innovations in industrial relations practices that occurred in prior decades. The next three sections then discuss innovations in employee participation, work redesign, and new technology and their effects on the performance outcomes of interest to

firms, workers, and policy makers. Although each is discussed separately, a central conclusion that emerges from this review is that it is their combination that produces the most powerful benefits for the parties and holds the greatest relevance for public policy. The final two sections of the report discuss obstacles to further diffusion and institutionalization of these workplace innovations and draw out implications for the future of public policy.

The Growth of Workplace Innovations:

Although there are no reliable national data bases that allow precise estimation of the scope of innovation in workplace practices in the 1980s, several ad hoc surveys and the enormous attention paid to these issues by researchers and practitioners support the conclusion that both activity and interest in these issues has escalated to unprecedented levels. For example, a nation-wide 1982 study by the New York Stock Exchange found that 44 percent of responding firms reported some degree of quality circle activity (a form of employee participation). Moreover, three-quarters of these programs were less than two years old. The respondents also reported a high level of job design or redesign activity (46 percent), though the reported incidence of specific work organization changes where lower -- 22 percent reported job enlargement activities, 18 percent reported job rotation activities, and 16 percent reported the use of production teams (NYSE, 1982). The widespread introduction of employee participation activities was corroborated in a 1985 survey in which 36 percent of respondents reported some form of employee participation activity underway in their firms. This number rose to 45

percent for establishments with 1,000 or more employees (Alper, William, Pfau and Sirota, 1985). Continued private-sector activity in the area of employee participation was highlighted in a 1988 national survey of large employers, which found that approximately half reported some form of employee participation program (Ichniowski, Delaney and Lewin, 1988). Again this survey showed that the majority of these participation experiments were initiated in the 1980s.

Although there is little parallel survey data on changes in work organization and the introduction of new technology, there is considerable case-study evidence to suggest that these two areas have occupied a major role in private sector employment relations throughout the 1980s. Indeed, as we will note below, there are strong theoretical arguments and a small but growing body of empirical evidence to suggest that there are important interconnections among these three types of innovation.

The growing attention to employee participation, work redesign and new technology in the 1980s can be traced to changes in the competitive and technological environments facing American firms. The 1980s have been marked by increased international and domestic competition; shorter product life cycles; greater differentiation and specialization in markets and consumer tastes; greater consumer selectivity on product quality; increased availability of new, computer-based information processing and manufacturing technologies, and; increased use of plastics and other new materials. There is growing consensus among scholars and practitioners that as an advanced industrial society, the U.S. must achieve and sustain a comparative advantage by developing and fully

utilizing its technological and human resources. This in turn requires changes in industrial relations and human resource practices to achieve and sustain a highly skilled, motivated and committed workforce; flexibility in the organization of work and the deployment of human resources; and a high level of employee participation and labor-management cooperation (Piore and Sabel, 1984; Kochan, Katz, and McKersie, 1986; Marshall, 1987; Walton, 1987).

This same theme is echoed in the reports and recommendations of numerous productivity or competitiveness commissions issued in recent years ranging from the report of President Reagan's Council on Competitiveness (1985) to the report of the Cuomo Commission on Trade and Competitiveness (1988) to the Collective Bargaining Forum, a bipartisan group of corporate chief executive officers and national union leaders (Collective Bargaining Forum, 1987) to report on the role of technology and employment prepared by the National Academy of Sciences (Cyert and Mowery, 1987) to a forthcoming report of MIT's Commission on Industrial Productivity (Dertouzos, Solow, and Lester, forthcoming). Thus, an important distinguishing feature of recent workplace innovations is that they are seen as critical to enhancing the competitiveness of individual firms and the national economy. As we will see, this motivation is somewhat different from the motivations that gave rise to interest in these subjects in earlier periods.

THE HISTORICAL AND THEORETICAL CONTEXT

Current employee participation and work redesign initiatives have been preceded by at least five similar historical developments, each of which hold important lessons for current initiatives. These are (1) the history of union-management committees in the U.S., (2) the rise of the human relations movement, (3) the emergence of socio-technical design principles in Europe and their application in the U.S., (4) the early QWL movement in the U.S., and (5) the growing attention to Japanese production systems. We will review briefly the lessons that can be derived for current innovations from these earlier developments.

Union-Management Committees

The establishment of union-management committees, which dates back in the U.S. to at least the beginning of this century, represents the first set of historical roots. At the turn of the century, joint committees were established in the coal industry regarding mine safety. In the 1920s and 1930s there were union-management committees and shop floor committees established in the textile, garment, and railroad industries -- many of which featured high levels of direct problem-solving about production issues (Douglas, 1921; Jacoby, 1983). During World War II there were over 5,000 union-management committees established to aid in the War-time production efforts (de Schweinitz, 1947). In the 1950s joint committees were established in the steel, meatpacking, longshoring, and other industries to address issues of

technological change and the tenor of labor-management relations. In the 1960s and 1970s there was growing usage of issue-specific committees, especially in the areas of employee assistance and health and safety.

Historically, these joint committees have been found to endure so long as they served as a supplement to formal collective bargaining; that is, the committees lasted when they provided the parties a forum for problem solving or integrative bargaining (Walton and McKersie, 1965) that addressed important problems in a subordinate or adjunct relationship to formal negotiations and day to day grievance administration (Gomberg, 1967). Since most of today's employee involvement and work redesign efforts in unionized settings operate under the guidance of a joint committee, a key lesson from earlier experience with labor management committees is that the new initiatives must be linked to the collective bargaining relationship in a way that extends the ability of the parties to solve important problems without undermining or seeking to substitute for the formal bargaining relationship. In short, workplace innovations must be integrated into the on-going bargaining relationship and related governance structures found in the employment relationship (Kochan, Katz, and McKersie, 1986).

Human Relations Movement

The second set of roots for current initiatives lies in what is known as the human relations movement. Beginning with a set of studies at General Electric's Hawthorne works (Rothlisberger, 1941), the human relations movement elevated interest in issues of employee motivation and job satisfaction. Techniques such as job rotation and job enlargement

were employed so as to reduce alienation and enhance motivation (Blauner, 1964; Hulin and Blood, 1968). Ultimately, a good job came to be defined as including high task variety, feedback, challenge, autonomy, and the opportunity to learn new skills (Hackman and Oldham, 1980), all of which were expected to contribute to higher levels of individual job performance and organization-wide productivity.

While the techniques and principles that emerged from the human relations movement directly support notions of employee involvement and job redesign, there are two core issues raised by these experiences. The first is the lack of strong and convincing evidence that the humanization of work does actually lead to improved productivity. The evidence is quite strong that participation and job redesign is associated with higher job satisfaction and morale, however, most reviews of the evidence from the 1950s through the 1980s found the evidence for positive productivity effects to be mixed at best (Schwab and Cummings, 1970; Cammeron and Whetton, 1983).

The second caution arises for the failure of the human relations movement to capture enduring the interest or support of significant numbers of line managers, union representatives or workers. Since many of the early experiments were conducted by social psychologists in conjunction with personnel staff, line managers were often skeptical of the benefits of the staff innovations. Moreover, the human relations techniques drew on principles from individual and group psychology that emphasized changing worker attitudes rather than changing worker conditions. As such, many union leaders and workers saw the human

relations initiatives as efforts to manipulate employees, undermine the role of unions and weaken collective bargaining.

Thus, a key lesson derived from the human relations movement is that the key power holders in organizations (line managers, union officials) must both be directly involved in the innovation process and must see the changes as aimed at addressing the issues of critical concern to them and their constituents. Ultimately, these key officials must see tangible economic benefits arising from these efforts in order to overcome their innate skepticism of staff or behavioral science driven theories of employee motivation and behavior.

Socio-Technical Systems

A third part of the foundation of current employee involvement and work redesign initiatives lies in the emergence in Western Europe in the 1960s and 1970s of a set of socio-technical systems (STS) design principles. It was first in England that social scientist applied lessons from the operation of leaderless or autonomous groups to workplace settings (Trist, 1981). Then, in Scandinavia, the principles of worker autonomy were linked to the design and layout of equipment, which led to the conceptual notion of blending social and technical systems (Emery and Trist, 1969). While new approaches to auto assembly in Volvo's Kalmar plant are, perhaps, the best known examples of the application of STS principles, it is important to note that many aspects of STS are so widespread in Scandinavia (and particularly in Sweden) that they are integral to the laws regulating employment relations. Finally, it should also be noted that many of the principles of STS draw on

principles of job variety and group interaction that were central to the ideas that emerged from the human relations movement.

The issues raised by the socio-technical systems experiences lie in their North American applications, which until recently have been limited to designing from scratch of new manufacturing facilities. Often built in open rural fields (and hence known as greenfield plants) these facilities have earned a reputation for becoming isolated within larger bureaucratic organizations that operated on different principles, which raises serious concerns regarding the diffusion of such innovations. Also, the U.S. greenfield facilities became famous for building high levels of employee commitment (Walton, 1980) and, as a result, most of the plants have remained unorganized by unions. Thus, even though the first union-management quality of work life initiatives in the U.S. were partly modeled on the European STS experiences, (such as the early Bolivar (Harman) and Rushton experiments) there has been a continued controversy over the extent to which social-technical systems are inherently anti-union when applied in the U.S. context (Kochan, Katz and Mower, 1984).

Moreover, socio-technical analysis lost credibility among some scholars and practitioners over the years for its failure to deliver on its original promise of actually joining the analysis and design of technical and social dimensions of production systems and adapting them to the specific needs of different workplaces. Instead two patterns emerged. First, the technical dimensions were rarely modified in significant ways because few changes were made in the design principles or processes used by engineers to design the hardware dimensions of new

technology or production systems. Second, instead of varying the form of work organization to fit different technical or social settings, socio-technical theorists and practitioners tended to advocate one solution--the use of autonomous work groups (Hackman, 1982).

Thus several lessons can be derived from the prior experience with socio-technical models. First, ways must be found to integrate these changes in work organization and technology in existing as well as greenfield sites in order to overcome the isolation effects of earlier experiments. Second, a real joining of the design of the hardware and work organization dimensions of new production systems is necessary to implement socio-technical principles. But this will not happen in the absence of significant changes in the way we design these systems. Third, autonomous work groups or teams are not the only way to capture the motivational benefits of worker participation, flexibility, and autonomy.

Quality of Work Life

The early quality of work life (QWL) initiatives in the U.S. represent a fourth set of roots for current innovations. While collective bargaining language addressing the issue of QWL dates back to 1973 (and the term was coined a few years prior to that), the first experiments aimed at fostering higher levels of employee participation in decision-making did not begin until the late 1970s. The early QWL initiatives, like the STS efforts, drew on principles from the human relations movement. Here, however, the focus was less on the

organization of work and more on creating workplace structures that would foster employee participation in decision making.

During the late 1970's, funding for a variety of demonstration projects was provided by the National Commission on Productivity and Quality of Working Life, in conjunction with the Ford Foundation. Despite governmental and foundation support, only a handful of large employers and unions showed interest in the programs. By the end of the decade, support for the National Commission had dissipated. It is ironic that, just as the Commission disbanded, interest in the private sector was about to accelerate. In subsequent years there has emerged a strong information-dissemination role regarding employee involvement and other issues within the U.S. Department of Labor. Within the Federal Mediation and Conciliation Service, there is also a small grant program to support labor-management cooperation.

The early experiences with QWL suggest that it is difficult for government policy makers to motivate workplace innovation in the absence of a shared interest or an accumulated body of experience with these innovations in the business and labor communities. Instead, the initial experimentation with new practices must arise out of the felt needs of management and/or labor. Then, as the more recent work of the Department of Labor and the Federal Mediation and Conciliation Service demonstrate, the government can play an extremely important role in evaluating of these experiments, disseminating information about them to other interested parties, and supporting their diffusion and institutionalization. We will return to a detailed discussion of this important lesson in the final section of this report.

Japanese Management Practices

The final set of roots for current employee participation and work redesign initiatives lies in the Japanese experiences with quality circles and new production operations. It was the success of Japanese firms in automobiles, electronics and other industries that elevated public interest in the use of quality control circles (employing statistical process control (SPC) techniques), just-in-time delivery and tight feedback loops in production operations.

Initially, the various Japanese management practices were treated in a piecemeal fashion. For example, quality control circles (QC) were introduced as stand-alone interventions in a number of firms. The high failure rate of QC's and other efforts to imitate Japanese practices piecemeal were taken by some as evidence that these principles were not transferrable to the American culture and environment.

More recently, however, the economic performance of plants in the U.S. operated by Japanese owners and managers that have adapted broader components of Japanese production and human resource management systems (the so-called "transplants") have begun to change this view. While we will discuss the evidence on these transplants more fully later in this report, it is worth noting here the central lesson that is emerging from the debate over Japanese management practices; namely, it is no single technique or practice that produces significant and sustained differences in outcomes but rather the totality of the approach to integrating technology and human resources with the long term strategies and values of the firm that appears to be important. Again, this theme of the importance of achieving a close integration among innovations in

workplace practices will be evident as we review the evidence on the effects of the 1980s efforts with employee participation, work redesign and the introduction of new technologies and production methods.

EMPLOYEE PARTICIPATION

The most frequent innovation initiated in industrial relations in the 1980s has been some form of employee participation. In our previous work on this subject we emphasized the need to examine the dynamics of these processes over time since their long-run fate and impact are determined by whether or not the parties successfully negotiate their way through various pivotal events or crises (Kochan, Katz, and Mower, 1984; Kochan and Cutcher-Gershenfeld, 1988). We will follow this approach here and leave to the companion paper being prepared by Levine and Strauss a discussion of the various structural factors that influence the success of these efforts.

Since the vast majority of participation processes have been initiated by employers in response to pressures to increase quality, reduce costs, or solve other production problems, the first challenge faced by these efforts lies in achieving worker and, if present, union, support and participation in the processes. In the early 1980's, employee acceptance of participation followed a frequently repeated pattern whereby up to one third of the workforce in a given location would volunteer for a problem-solving group, but there would be a sharp decline in the rate of further participation (Kochan, Katz, Mower, 1984). The evidence suggests that the declining levels of participation can be

traced to at least three factors: (1) worker and/or union concern that the process only serves the employers' interests, perhaps even at the expense of employee and union concerns for employment security and other objectives valued by workers and union leaders; (2) the related lack of direct links between participation and any tangible financial rewards; and (3) divergence in worker preferences regarding the form and intensity of participation they prefer to be involved in on their jobs.

Within the first few years of the establishment of an employee participation effort there are one or more test issues that begin to signal the extent to which the effort will serve the interests of employees and a union (if present), as well as the interests of the employer. Examples of such issues include whether employee suggestions for increased efficiency threaten any individual's job security; the speed of implementation on issues relating to employee safety and comfort; the extent to which problem-solving activity is seen as undercutting collective bargaining; management's openness to discussing issues that are traditionally managerial rights such as access to confidential information and work allocation decisions; the provision of financial rewards or a sharing of the gains from participation; acceptance by both the company and the union of a structure for problem-solving that runs parallel to both the company hierarchies and the collective bargaining grievance procedure; and the signals sent by concurrent managerial decisions about new technology, subcontracting, new facilities, executive bonuses, and related matters. Such issues are pivotal events in the life of an employee participation initiative -- if they are resolved successfully, the initiative is reinforced and often

expanded; if they are not, the initiative is undercut, interest and activity plateau and often the process is abandoned (Cutcher-Gershenfeld, Kochan, and Verma, 1987).

A second factor that can contribute to the decline of an employee participation initiative lies in a set of psychological questions that are only partly understood by the research community. While attitude surveys consistently report that U.S. workers want a high level of input in workplace decisions that directly affect them, the same workers differ greatly on the nature and scope of involvement that is seen as meeting this need. The range of employee preferences is illustrated in the case of Xerox and the Amalgamated Clothing and Textile Workers Union (ACTWU), were the parties established a contingent structure that allowed for many forms of employee participation. Now, four years later, we observe some employees who just want to attend monthly or bi-weekly information meetings; others who will volunteer on an ad hoc basis to serve on problem-solving teams to address a specific issue or concern; still others who will serve on a continuing basis as members or even leaders of problem-solving teams; and, finally, some employees who will pursue the option of establishing themselves as autonomous work teams (Cutcher-Gershenfeld, 1988). This experience and others like it would suggest that a pivotal event in the life of an employee involvement program that features just one form of participation may emerge at the point that all of the employees who prefer that form are involved. Further expansion (and even the stability of current efforts if an in-group and out-group is to be avoided) will depend on institutional flexibility in the structure of employee involvement.

Effects of Participation on Economic Performance

In recent years, there has been a growing volume of research on the relationship between employee participation and economic performance. Most of the literature has focused on initiatives that are still facing the sort of initial test events outlined above, without much consideration to the way participation efforts may evolve or without much attention to parallel changes occurring in work organization or to the introduction of new technology. Setting these limitations aside for the moment, those studies that have attempted to isolate the independent effects of employee participation have found few significant effects on productivity (Gershenfeld, 1987; Whyte, et al., 1983). There is some evidence of very small or modest effects on product quality, and some positive impacts on other outcomes such as declines in accidents, absenteeism, and grievances (Goodman, 1980; Rosenberg and Rosenstein, 1980; Katz, Kochan, and Gobeille, 1983; Katz, Kochan, and Weber, 1985; Katz, Kochan, and Keefe, 1987; Witte, 1980; Cammman, Lawler, Ledford, and Seashore, 1984; Ichniowski, Delaney, and Lewin, 1988). We interpret the literature as confirming the limited impact of employee participation taken by itself. But what if an employee participation initiative endures and expands in focus?

Cutcher-Gershenfeld (1988) investigated this specific question in his quantitative evaluation of the combined effects of employee participation and a variety of other changes in, problem solving, conflict resolution, worker autonomy, work redesign, and information sharing at Xerox. He found that, consistent with the previous studies, when examined alone, participation in the form of structured problem

solving showed relatively weak performance effects. However, a combined measure of workplace innovations that included participation with the other changes listed above were found to be associated with improved performance on a variety of critical outcomes including productivity, unit costs, and quality. We interpret these results as further support for the hypothesis that, standing alone, employee participation is associated with modest economic returns to employers, workers, and unions. But the impact of participation is substantially greater if the parties allow it to expand into broader areas, allow more flexible forms of problem solving and work organization to be implemented (as they are suggested by those involved in the participation effort), and (in unionized settings) are successful in integrating the participation effort into the ongoing union-management relationship.

Effects of Participation on Institutional Practices

If the participation initiative survives an initial round of pivotal events, and broadens out in the way described above, its impacts on the parties go far beyond its direct performance effects. The initiative will challenge a variety of traditional practices and begin to affect the most fundamental interests of labor and management. These include the basic structure of compensation, the overall level of employment security, the protection of management rights, and the very roles of employees and supervisors. In unionized settings, deeper questions are also raised regarding the roles of union leaders, the role of collective bargaining and the institutional security of the union.

As the scope of employee decision making expands, for example, the line between managerial and employee authority blurs. Not only does this subject employees to a whole range of new managerial stresses, while at the same time, leaving supervisors feeling isolated and threatened (Parker and Slaughter, 1988; Klein, 1988), but it raises policy questions about who has exempt status under the law. For union leaders there are fundamental dilemmas regarding the degree to which they can concurrently support joint initiatives while still maintaining the image and reality of their independence from management (Cutcher-Gershenfeld, McKersie, and Wever, 1988). Further, as employee problem-solving engages issues that really matter to either the employer or the employees, it is likely that there will be implications for wages, hours and working conditions. That is, even if employee participation efforts in unionized settings are declared to be independent of collective bargaining, either the efforts will have deteriorated or they will have an impact on the bargaining relationship through the treatment of issues such as employment security, new technology, work organization, gainsharing, and training.

Thus, if an employee participation initiative is to endure for more than a few years and if it is going to make a difference for any of the parties involved, fundamental changes will have taken place in the employment relationship. Perhaps it is not surprising, then, that many employee participation efforts have not lasted more than a few years (Goodman, 1980; Lawler and Mohrman, 1986; Drago, 1988). Thus, it is our conclusion that narrowly focused employee participation initiatives will not be likely to serve the interests of either labor or management and, as such, will not be likely to endure or diffuse throughout the economy.

In order to construct a broader picture employee participation efforts, it will be necessary to examine the dynamics associated with changes in the design of work and the introduction of new technology.

WORK REDESIGN

This section will summarize developments in work redesign in recent years. For illustrative purposes, it will assess the experiences of one industry that has invested heavily in work redesign efforts -- the auto industry.

Work Redesign in the 80s

Three inter-related work design initiatives appeared to gain strength during the 1980s, and show prospects for longer-term durability: 1) the use of work teams; 2) the reduction of job classifications and work rules (at times combined with compensation plans that encourage skill acquisition); and 3) integrating the responsibility for quality control into production or operational jobs. We will review each in turn before tracing their application in the auto industry.

The move to work teams incorporated a range of efforts to restructure work to be shared among a group of employees. Most teamwork systems are more modest in scope than the self-managing teams of socio-technical theory. Common features of team work systems include an elected or appointed team leader who both supports the team (training, getting materials, replacing absent members) and coordinates interactions between the team and the rest of the organization (on such issues as

scheduling, quality, staffing); a weekly team meeting for information-sharing and/or problem-solving; and the application of some human resource/labor relations policies (such as compensation, overtime equalization, absenteeism, job bidding rights) at the group rather than the individual level.

A work team structure has a number of advantages. First, it is easier to design more varied and complex work for a group than for an individual. Second, a team provides a natural structure for job rotation, training, problem-solving activities, and communication. Third, less traditional supervision is needed because peer pressure among team members, in combination with team-centered policies, self-regulates team activities. Fourth, teams serve a social function, with members forming strong ties that often persist outside of the workplace.

The reduction in job classifications and work rules is a closely aligned change whose primary goal is increased flexibility in the deployment of labor to meet fluctuating production and/or market conditions. In some cases employers sought reduction in classifications as part of concession bargaining package aimed at reducing costs. While such flexibility and cost reduction had been sought by managers in many industries starting in the 1970s, it was only when reduced classifications became linked to a strategy of training workers in multiple skills (and when foreign competition revealed the inefficiencies of existing systems) that this restructuring became more widely accepted by unions as well.

In the extreme case of a single classification for production workers and a couple of classifications for skilled trades, there are

other important effects besides flexibility. Wages no longer bear any relation to specific jobs and all position-related status differentials among workers are eliminated. This shifts worker incentives in the direction of skill acquisition as a source of status and satisfaction.

Some companies have introduced compensation plans that bolster the incentive for skill acquisition, generally in combination with the reduction of job classifications. In such plans, most commonly known as "pay for knowledge", an employee can move through a progression of pay increases by mastering an increasing number of skills. The diffusion of this approach has been limited, in part because its motivational level is limited once employees reach the top of the pay scale for acquired skills. Furthermore, unless the mastery of skills stimulated by "pay for knowledge" plans is linked to work structures that insure the regular exercise of those skills, the desired degree of flexibility may not be achieved. Finally, difficult equity issues are sometimes encountered when converting to pay-for-knowledge plans requires the placement of some workers in the upper range of the pay scale.

The third change, the integrating of quality control into production or operation jobs, is an outgrowth of intensified competitive pressures for quality and a reflection of the influential philosophy that quality must be "built in" rather than "inspected in". It also reflects a different approach to work redesign that emphasizes the "vertical integration" of staff functions into operational jobs. This approach provides more variety, complexity, and challenge than earlier job enlargement efforts; for example, workers responsibility for quality checks often receive training in Statistical Process Control and maintain

process control charts. Workers also become an integral part of the communications system in which feedback about discovered defects is sent speedily to the source of the problem.

Work Redesign in the Auto Industry

All of the work redesign initiatives listed above, bundled together under the name "team concept", have been the focus of extensive restructuring efforts in the U.S. automobile industry in the 1980s. As such, this case is worth examining for its lessons about the effectiveness of work teams and other structures.

There has been an intensive debate over the advantages of teams, reduced job classifications, and the assignment of quality control to workers within the United Auto Workers union. Advocates of team concept within the union argue that it is necessary for competitive survival, it offers workers more variety and a chance to learn new skills, and is consistent with the union's long-term goal of achieving industrial democracy (Ephlin, 1988; Lee, 1988). Union opponents claim that the team concept weakens seniority rights and increases workload by adding new responsibilities such as quality control; that team leaders are pseudo-foremen, under management control despite their hourly status; that the peer pressure within teams pits workers against each other, and leaves no clear target for grievances; and that the team concept is a ploy to help management justify a reduction in job classifications and work rules, which increases managerial discretion (Parker and Slaughter, 1988).

Furthermore, the actual implementation of the team concept by U.S. auto companies has varied widely. In some plants, the team concept was

established as the basic work structure from the time they opened. In other plants, the team concept was a negotiated change, often as a concession from the union in return for a management commitment to invest in a new product line or process technology. In some plants, teams are little more than a formal designation of sub-groups of workers, with no job rotation, team leaders who primarily provide absenteeism relief, and little communication or coordination among teams. In other plants, all aspects of the team concept seems to be functioning quite completely and effectively. Finally, there are still many plants that have not attempted to implement any aspects of the team concept.

Given this record of controversy and partial implementation, it is perhaps no surprise that the expected economic benefits of the team concept have not consistently materialized. Indeed, a recent study (Katz, Kochan, and Keefe, 1988) carried out within the company that has used teams most extensively, found that after controlling for the effects of participation, degree of cooperation, and other labor relations practices, the independent effects of work teams on economic performance ranged from zero to slightly negative.

This result could be interpreted as an outcome of the idiosyncratic conditions under which the team concept was introduced in this company, as a sign of poor implementation, or as evidence that teams per se are less efficient than their proponents suggest. But we believe it has a larger significance -- that the team concept, like employee involvement, can accomplish little unless it is integrated with broader changes in organizational structure, production practice, and business or technology strategy. Below, we will argue the "integration" hypothesis more fully,

and provide evidence that the team concept does lead to improved economic performance in such an integrated system. But first, we will briefly discuss another major development of recent years -- the proliferation and rapid diffusion of new microprocessor-based technologies, and its significance for employee involvement and work redesign.

THE ROLE OF NEW TECHNOLOGIES

By now, the dramatic impact of the microprocessor on the technological capabilities available to organizations is well-known. (e.g. Forester, 1980;1985). The pace and scope of the change brought about by advances in microchip technologies has been remarkable. What is less appreciated is the impact of this technology on the range of possibilities for both organizational structures and work design. We speak here of an impact on possible structures and designs because microprocessor-based information technology is so flexible that it can either reinforce and replicate existing organizational arrangements or support a wide variety of alternatives. Research seeking to understand the organizational impact of information technology has so far only succeeded in demonstrating that the technology has no determinate force -- that it assumes different forms and has different consequences in different contexts (Walton, 1981; Attewell, 1987; Chalykoff, 1988).

This very indeterminacy highlights the importance of management choices about technology strategy, both for the work reforms discussed above and for the very effectiveness of the technology once in place. A traditional approach to technology will contradict and constrain these

work reforms and will limit its overall effectiveness. There are alternative technology choices which can complement and strengthen work reforms and improve the utilization of new technological capabilities as well.

The traditional approach to technology development and implementation is antithetical to the work reforms discussed above. Technology design is carried out by isolated technical specialists following Tayloristic principles who deliver a finished product to be implemented, after which the organization is expected to "adapt" to the technology. Employee involvement, if considered at all, is only part of a bid to overcome employee resistance during the last stages of implementation. Work redesign is similarly confined to issues of "ergonomics" or the "user interface." Finally, any job loss, deskilling, or otherwise detrimental impacts on employees are seen as inevitable, with managerial efforts devoted to minimizing their extent.

Thomas (1988) has demonstrated why the traditional approach to the design and implementation of new technology discourages innovations in work organization and human resource policies. He traced the decision-making process for three manufacturing technologies from the earliest conception of the problem to their implementation on the shop floor. His results showed that, under conventional arrangements, work organization and human resource issues get addressed very late in the decision sequence, long after the hardware choices are made. This not only constrains the range of options open for work organization design. It also leads human resource managers and union representatives with little

to do but negotiate over pay rates and classification issues thereby reinforcing traditional adversarial relationship patterns.

However, another course can be chosen. The change to new technologies provides opportunities for broader organizational change because it helps to "unfreeze" existing policies, practices, and attitudes (Lewin, 1948). At such a time, employee involvement efforts increase in value for two reasons: 1) They can result in better communication from managers to employees about the change -- the rationale, the capabilities of the technology, the impact on jobs and skills -- and increase manager's understandings of the perceptions and concerns of employees; 2) They can produce better ideas about how new technological capabilities can be utilized.

This is equally true of communications between technology users and designers. One recent study of the development of new information systems examined the effects of different patterns of interaction and involvement of users and designers and found that the most effective applications resulted when both groups exerted a high level of mutual influence through the problem formulation, solution, and implementation stages of the process (Henderson 1988). Similar research on new product development has also highlighted the advantages of parallel engineering and development processes whereby various organizational stakeholders have continuing input from the earliest stages (Dougherty, 1987).

Flexible technologies also make possible a wider variety of different work designs. The steadily reducing costs of computing power make it possible to consider alternate work designs that were perhaps technically feasible but overly costly with previous generations of

technology. This can alter manufacturing processes quite dramatically. Volvo has used Automatic Guided Vehicles to pioneer an alternative to the moving assembly line, with these computer-controlled carriers moving between work stations and then stopping to allow teams of workers to complete assembly tasks; at the new Uddevala plant, each team will build only 1-2 complete cars per day, with parts also automatically routed to the right work station.

The flexibility of computer-controlled machine tools allows for frequent changes in product mix, thus making it economical to reduce product "batches" and to produce a more complex mix of customized or niche products. In short, this technology eliminates many of the cost advantages of the high volume production of standardized goods. Finally, microprocessor-based technologies have the ability to "informate" as well as "automate" -- to provide extensive information about work processes that can be used to improve both processes and products, as well as carrying out such processes directly (Zuboff, 1988).

The traditional approach to technology is still dominant. But its limitations are becoming increasingly obvious. Even in the normally pro-technology business press can be found grumblings that the expected payoffs from information technology are very slow to materialize. Economists who have studied this problem agree that investments in information technologies have achieved very poor economic returns compared to other forms of capital investment (Loveman, 1988; Roach, 1987).

We are brought back again to our integration hypothesis. Traditional technology strategy, with its faith that technology alone is

the path to competitive advantage, both undercuts work reform efforts and results in the underutilization of technological capabilities. Moreover, because the traditional strategy maintains a serial approach to decision making, the earliest problem definition and design stages are dominated by technical and financial professionals with little knowledge of or motivation to consider human resource issues. This biases the entire process toward strategies that emphasize investments in new and often overly complex hardware which further increases the costs and the time required to implement new systems. In contrast, a technology strategy and development process which supports and is integrated with employee involvement, work redesign, and other human resource/labor relations policies should result in better utilization of the technology and improved organizational performance.

INTEGRATION OF PARTICIPATION, WORK REDESIGN, AND TECHNOLOGY

For much of this paper, we have reiterated the theme (and provided the evidence) that isolated initiatives, whether in employee involvement, work redesign, or new technology, tend to be short-lived and to have relatively little impact on the organizational outcomes they are intended to produce. In this section, we will examine in more detail the corollary argument -- what we have been describing as the "integration" hypothesis.

As an example, we will focus on a recent development that constitutes a kind of natural experiment for the hypothesis we wish to test: the establishment of new manufacturing plants that are owned by

Japanese companies (or in joint venture with American companies), located in the U.S., and employ American workers, engineers, and managers. These facilities are known as "transplants".

The logic of the natural experiment is as follows: The Japanese approach to organizing a production system involves the extensive integration of technology, production practices, and human resource policies -- including employee involvement and the team concept. As utilized in Japan, such a production system has achieved productivity and quality performance far surpassing most American competitors. If this same production system can be found in the Japanese transplants in the U.S., and if the performance outcomes are comparably high, we can conclude that it is not the characteristics of a national culture, a company, or a workforce but distinctive characteristics of the production system that explain those outcomes -- namely, the integration of the elements described above.

A "Humanware" Perspective

First, we will explore exactly what "integration" means in the Japanese production system. Shimada and MacDuffie (1987) use the concept of "humanware" to capture the interdependence between the technical and human resource systems in the Japanese approach to manufacturing systems. As illustrated in Figure 1, the production system is highly dependent on human resource capabilities that achieve high levels of skill, motivation, and adaptability. These human resource attributes are necessary to support such production policies as just-in-time production (in which inventory levels are kept low to minimize costs and highlight

production problems), quick die changes (in order to make the production of smaller lots economical), quality inspection built into production jobs (in order to build in quality the first time rather than inspecting it in later), and minimal repair areas (because with no place to put vehicles needing repair, the pressure to achieve quality on the line is maximized). Together these human resource and production policies are expected to achieve both high productivity and high quality.

Furthermore, other distinctive features of Japanese employment policies and work organization are also an outgrowth of the integration of human resource and technology strategies. These include recruitment to long-term employment, for which a willingness to learn new skills is more important than previous experience; extensive training and job rotation to develop multiple skills; compensation contingent on performance, particularly skill development; internal promotion; low status differentiation among managers and workers; and work teams. Complementing these policies and structures is the incremental, continuous problem-solving (kaizen) that is an integral part of daily production activities. Kaizen improves performance not only by eliminating production problems but also by maintaining and improving the skills, adaptability, and motivation of the workforce. Thus, problem-solving processes are the dynamic element that makes the integrated production/human resource system operate effectively; employee involvement in the most fundamental aspects of the firm's work.

Shimada and MacDuffie characterize the Japanese approach to production as "fragile" because a system so dependent on the contribution of human resources is quite vulnerable to any drop in the skill,

motivation, or flexibility of the workforce. In contrast, the traditional American production system is "robust" because it attempts to protect the production process from the effects of varying contributions from the workforce: narrowly defined jobs that can be filled by interchangeable, low-skilled workers; large inventory buffers that minimize the disruption caused by production errors or poor quality parts; extra employees to cope with higher absenteeism; sophisticated quality control inspection system and specialized personnel to catch defects after production is completed; and technology designed to limit worker discretion.

While this approach was developed in Japanese organizations, it is not culturally-bound. In fact, Shimada and MacDuffie find that the Japanese production system has been quite completely transferred to Japanese-owned "transplant" operations in North America. Mahoney (1988) reached the same conclusion in a careful and detailed study of a Japanese auto parts supplier. There are minor differences, just as there are differences in the production systems of different Japanese companies, but the similarities are far more pronounced than the differences, particularly in contrast with U.S. practice.

Effects of an Integrated Production System

The economic performance of this approach to production is well demonstrated in a series of M.I.T. studies, again in the automobile industry. The first study (Krafcik, 1988) involved 32 automobile assembly plants owned by a variety of companies and operating in a number of countries. Productivity data, based on the number of direct,

indirect, and salaried labor hours per vehicle, was collected during plant visits and later adjusted to achieve comparability, using such factors as the size of the vehicle, the option content, and the number of welds required by the product design; further adjustments were made so that only a set of "standard activities" common to all plants were considered in assessing performance.

This analysis showed a wide variation in economic performance among the 32 plants in the sample: the five plants in Japan averaged 20.3 hours per vehicle, the thirteen plants in North America (three of which were Japanese transplants) averaged 24.4 hours, and the eleven plants in Europe averaged 33.9 labor hours per vehicle. The Japanese transplants in the U.S., considered separately, average 19.6 hours per vehicle, better than the average of plants in Japan.

Furthermore, the performance differentials in the overall sample do appear to be linked to the degree of integration between technical production practices and human resource policies. When elements of the team concept exist <u>in conjunction</u> with just-in-time inventory systems, the integration of quality inspection with production jobs, and the minimizing of end-of-process repair, high performance results. This same finding is even more true when quality rather than productivity is used as the performance measure.

Further support for the integration hypothesis is provided by detailed paired comparisons of plants following traditional high technology strategies (i.e., major investments in hardware without corresponding changes in work organization and labor-management relations) with plants following a more integrated strategy (moderate

investments in new hardware in conjunction with major innovations in work organization, employee participation and related human resource practices). Plants following the integrated strategy achieved significantly higher productivity and quality than did the traditional high technology plants. Moreover, the integrated plants also outperformed conventional low technology plants that had traditional labor relations practices (MacDuffie and Kochan, 1988). These findings have recently been replicated with an expanded sample of 46 assembly plants (Krafcik and MacDuffie, 1989). Thus, technology alone does not appear to be a solution to the competitiveness challenges facing American firms.

What of the social ramifications of a tightly integrated production system? In a system so dependent on the workforce for productivity-improving ideas, some form of employment security is practically a necessity, since few employee will willingly offer ideas that will just result in loss of jobs. Such employment security is, of course, institutionalized for the car workforce in Japan and very rare in the U.S. But to return to the case of the transplants, while they have offered no legal guarantees, they have also not resorted to layoffs even during fairly severe volume downturns, choosing to train employees instead. Again, given the dependence of their production systems on workforce motivation and willingness to learn new skills, one would expect the transplants to have a stronger incentive to maintain employment security than a more "robust" production system.

Opponents of the team concept in U.S. plants (Parker and Slaughter, 1988) voice the same criticisms of Japanese team systems, and address

further criticisms at the tightly integrated production system, calling it "management by stress". The very lack of inventory buffers in a just-in-time system that requires worker attention to quality also means that when there is a problem with a faulty part or a machine breakdown, there is tremendous pressure to remedy it; otherwise, the entire department could be shut down, because there is no buffer of extra parts or work-in-progress for downstream work stations to draw on. For critics, this is just another way of squeezing intensified effort out of workers (even though not just workers but <u>everyone</u> in the production system feels the pressure to resolve problems almost immediately).

There is no doubt that the work pace is faster in the tightly integrated Japanese production system, and that the stress can be high as well. What is unclear is whether workers prefer this situation to the tension and low trust that accompanied the traditional system of close, autocratic supervision and adversarial labor relations. Some workers may find the problem-solving activities and multiple job tasks more rewarding, even if stressful, than the monotony of a single narrow repetitive task. Others may prefer the stability and limited mental demands of a traditional assembly line. No one has yet been able to gather the data on worker attitudes in the transplants to answer these questions.

By all available indicators, however, the American workers in the Japanese transplants and similarly structured American-managed plants are relatively satisfied with their experience. Grievances, absenteeism, and turnover are very low. Quality, which is clearly susceptible to worker discontent, remains high. This suggests the appeal of a production

system that emphasizes "working smarter", even as it makes demands on worker capabilities typically absent in mass production jobs.

On balance, both economic and social outcomes support the value of the integration of technology and human resource strategies -- of combining participative processes, work structures, and technical tools into a coherent, self-reinforcing production system that depends above all on the quality of the human resources that make it run. But the high performance of such a system is not enough to insure the adoption of such an integrated approach by other companies or in other industries. We turn now to consider why that is so -- why these innovations do not naturally diffuse.

OBSTACLES TO DIFFUSION

In the late 1970s one U.S. representative opposed the passage of an early version of the Labor-Management Cooperation Act of 1978 by arguing: "If this is such a red hot idea, why do we need...the public's money?" (Hearings on H.R. 2596, 1977). Implicit in this statement is the hypothesis that some natural market force or technological imperative exists which will insure widespread adoption and diffusion of labor-management innovations that have economic merit. This, however, is not an accurate depiction of the diffusion and institutionalization across the economy of economic and social changes in general, (Lewin, 1948; Mansfield, 1968; Nelson and Winter, 1982) and human resource practices in particular (Kochan and Cappelli, 1984; Jacoby, 1985; Baron, Dobbin, and Devereaux, 1986). The more common pattern is for experimentation to

occur in leading firms in response to external or internal pressures, followed by a period of debate, evaluation, and resistance in which various obstacles to further diffusion are identified. Diffusion then tends to follow a discontinuous pattern as a function of the interaction of pressures from labor and product markets, unions, and government policy. Diffusion can be facilitated by the development of networks of professionals knowledgeable in and supportive of the new practices. This pattern has been documented for practices as varied as collective bargaining, modern personnel or internal labor market policies, grievance procedures, and equal employment opportunity policies (Kochan and Cappelli, 1984; Jacoby, 1985; Baron, Dobbin, and Devereaux, 1986).

The workplace innovations discussed in this report are now well into this second phase of the change process. They have followed the familiar historical pattern of gaining interest in selected units within large firms and unions only to be slow to diffuse both within and across organizations (Walton, 1975; Cammann, Lawler, Ledford, and Seashore, 1984; Kochan and Cutcher-Gershenfeld, 1988). In this section, therefore, we turn to a discussion of the obstacles to further diffusion that have been identified in research to date and to a discussion of the role of management and labor strategies for overcoming them. Discussion of the role of government in the diffusion process is reserved for the final section of this report. We will focus on factors that affect diffusion across the economy and leave the analysis of barriers to diffusion within firms to the paper being prepared for the Commission by Strauss and Levine.

The Role of Competitive Strategies

One important reason that there is no natural set of market forces to insure widespread adoption and diffusion of these workplace innovations is that firms have a variety of competitive strategy options to choose from when confronted with intensified competition (Kochan, McKersie, and Cappelli, 1984; Cappelli, 1985). One response is to leave the market to lower-cost producers and to reallocate resources to other uses. Another is to attempt to retain market share by aggressively cutting costs. A third strategic response is to identify new ways to compete, for example, by emphasizing quality, product differentiation, and new product development. In reality, most firms engage in some combination of all of these responses to intensified competition. However, which of these is the dominant response will have a marked effect on employer interest in and/or long term support for the workplace innovations discussed in this paper.

Firms that respond to competitive pressures by abandoning the market or by primarily emphasizing short-run cost reductions will not see it as in their interest to encourage employee participation, work redesign, or to introduce new technology in ways that maximizes employee input and control. On the other hand, strategies that emphasize product and/or service quality, market differentiation, rapid and flexible adaptation to changing customer preferences do require a highly skilled, flexible, committed, and cooperative workforce. Likewise, employees will not respond with high levels of participation, flexibility, and cooperation with management unless they see the competitive strategies being adopted as consistent with their long-run interests. Thus, the

scope and pace of diffusion of workplace innovations in part will depend on the mix of competitive strategies that are adopted by American firms in response to global and domestic competitive pressures.

Technology Strategies

Like overall business and competitive strategies, technology strategies can either reinforce or undercut the full development and utilization of human resources. Firms that invest in new technology simply to reduce headcount or to gain greater control over labor are not only likely to discourage employee participation and support, they are also likely to experience significant negative reactions from their workforce. Chalykoff (1988), for example, has shown that the when the monitoring features of information technology are used as a control device they produce lower job satisfaction and higher turnover than when the same monitoring capabilities are used to provide employees with feedback and technical assistance. Thus how a technology is used and introduced will have a significant effect on firm and employee performance.

Thomas' (1988) study of technological change showed that significant changes in organizational structures, decision-making processes, and the distribution of power will be needed if human resource and work organization issues are to be integrated with the design of new technologies or production processes. These are not changes that will flow automatically from the generic nature of the technology but instead require conscious decisions and choices on the part of the firm and changes in the structure of labor-management relations.

Specifically, Thomas (1988) and others (Walton, 1982; Kochan, Katz, and McKersie, 1986) argue that to link successfully human and technical dimensions of technological change will require involvement of employees and/or their representatives with engineers and design specialists in all three stages of the technological change: (1) the development stage when key design choices are made and their effects on human resource and organizational practices are identified; (2) the resource allocation stage when scarce dollars and R&D staff are allocated across competing projects and performance benchmarks and payback criteria are set, and; (3) the deployment stage when new systems are implemented and modified in marginal ways over time.

The early attention to human resource issues is unlikely to occur if top executives and public policy makers continue to see expenditures in R&D as investments in new hardware that will substitute capital for labor or as a means of asserting greater control over workforce behavior. It also will not occur if human resource management professionals and labor representatives lack sufficient technical knowledge to add value to the analysis and decision-making in the early design and resource allocation stages of technological decision-making. Early attention to these issues will also not occur if labor leaders attempt to retain their traditional role of remaining outside of early consultation and involvement in order to protect their right to protest or grieve the prior decisions as their impacts on the workforce become visible during the implementation process. Thus, widespread diffusion of workplace innovations will require significant departures in technology strategies

and in the structures and processes by which new technology is developed and deployed.

Union Leadership Strategies

So far we have focused largely on changes in employer strategies, structures, and internal processes needed to promote diffusion of workplace innovations. In non-union settings, these are the primary factors accounting for the success or failure of these various reforms. In unionized settings, however, diffusion is highly dependent on the willingness of labor leaders to become more vocal and active champions of them and devote the resources needed to be skilled in their promotion and implementation. As is well known, there continues to be deep debate among union leaders over the merits and pitfalls of supporting employee participation, work redesign, and/or participation with management in technology planning.

As long as labor leaders remain ambivalent or equivocal on these issues one of two things will continue to happen. In some cases where employers are convinced these innovations are needed to be competitive, they will attempt to introduce them without active union support or involvement. Already there is evidence that some employers have been able to impose changes in work organization and technology in the face of direct union opposition (Cutcher-Gershenfeld, McKersie, and Walton, 1989). In other cases opportunities to consider the first strategy may be foregone for lack of anyone calling for employee input into these choices and strategies.

There is evidence to suggest that, contrary to current stereotypes, unions and collective bargaining can serve as powerful institutionalizing forces. Drago (1988) has shown that the presence of a union increases the probability that employee participation will endure over time. Our own case studies of workplace innovations (Kochan and Cutcher-Gershenfeld, 1988) identified various pivotal events where the absence of union support would have led to the abandonment of an employee participation effort. The Thomas (1988) and Henderson (1988) studies of the role of users in the design and introduction of new technology both suggest that successful involvement will require the development of new skills and technical knowledge on the part of union representatives. Union leaders are unlikely to invest in the development of these skills unless they become standard techniques for representing their members. This will only happen if labor becomes a visible and vocal champion of these innovations. Thus, as with previous personnel and labor relations innovations, the diffusion of these workplace innovations will depend on the extent to which the labor movement embraces them and gives them priority in its internal leadership development programs, in collective bargaining, and in its legislative agenda.

The National Labor-Management Relations Climate

At the same time the 1980s has been a decade of accelerated innovation in workplace practices, it has also been a period of increasing tension and conflict in labor-management relations. Employer opposition to union organizing has intensified, union membership continued to decline steadily, real wages remained stagnant, and while

the number of strikes declined many of those that occurred escalated into hard fought struggles for survival of the company and/or the union. Thus, the workplace innovations discussed in this report are taking place in an environment where the adversarial tensions between labor and management in American society appear to be escalating toward a crisis. This larger adversarial climate puts the fate of any single workplace innovation at risk and stands as a major obstacle to both widespread diffusion and institutionalization since the very basic requirements of trust, legitimacy, and institutional security needed to support cooperative behavior, risk taking, and innovation between two parties are absent. Thus, concern for diffusion of workplace innovations cannot be separated from concern over the future of broader industrial relations policy and practice. Addressing the connections between these two issues is a key task for public policy makers.

PUBLIC POLICY IMPLICATIONS

If the 1980s can be thought of as a time of private experimentation with workplace innovations, we would argue that it is time to move beyond an experimental stage. Overcoming the obstacles to further diffusion will require a more active and supportive public policy. The question therefore is: What broad principles and concrete actions should guide public policy efforts to promote and support diffusion and institutionalization of workplace innovations? We will focus on four interrelated policy initiatives: (1) providing a national data base for measuring the diffusion of innovative practices and evaluating their

economic and social consequences; (2) updating labor law to both remove the barriers to labor management cooperation and innovations and to endorse and promote these innovations as part of our national labor policy; (3) integrating support for workplace innovations with broader human resource, labor market, and economic policies, and; (4) providing the political leadership needed to produce a positive climate within which innovative labor-management relations can flourish.

Information and Data

As our review suggests, all the evidence available to date on workplace innovations comes from ad hoc case studies or privately collected survey data on limited, non-random samples. Not only does this limit the generalizability of the findings and results of these studies, it also limits our ability to estimate the scope and rate of diffusion of new practices. Thus there is no reliable estimate of the extent to which employee participation or work redesign principles have diffused across the American workforce. Nor is there a national data base that can support evaluation of the relationships between participation and workplace innovations, other human resource practices, labor market behavior, and the economic and social outcomes of interest to public policy makers. This is a particularly serious shortcoming given the "integration" hypothesis that is advanced in this paper. That is, our review of the evidence suggests that the potential benefits of employee participation and related workplace innovations depend on the extent to which competitive strategies, technology policies, and other organizational practices reinforce and support these innovations. Thus,

the data base needed to fully evaluate this hypothesis must combine data on individual attitudes and behaviors with this broad array of organizational practices and policies.

A first step toward informed policy making in this area would be the development of a national longitudinal sample of individuals and establishments with data on the nature of workplace practices and performance outcomes of central interest to individuals, employers, unions, and policy makers. This would be a natural extension of the government's traditional monitoring and evaluation role. Such a data base would need to include both individual worker attitude and demographic data and establishment data on work practices, labor-management relations and related human resource practices, production policies, technology and business strategies, and performance outcomes (productivity, quality, safety, absenteeism, etc.). To achieve maximum benefits the survey would need to be repeated on a regular basis, preferably annually or biannually.

The conceptual and research design issues for such a national data base have already been discussed in a Social Science Research Council report commissioned by the Department of Labor (Kallenberg, 1986). The Council was asked to assess the value in conducting a fourth round of the Quality of Employment Survey, a national survey of employee attitudes commissioned by the Department of Labor in 1969, 1973, and 1976. The Council concluded that a new data base on "America at Work" was needed:

> In response to the need for information on recent and on-going dynamic changes in the American labor force and economy, the Social Science Research Council's Advisory Group on a 1986 Quality of Employment Survey recommends that new surveys of employees and employers be initiated. These surveys should meet several goals: (1) information should be obtained form a large random sample of the nation's employed labor force,; (2) information should also be

collected from a national sample of companies and public-sector employers; (3) organizational data should be linked to the information obtained from employees; (4) information should be obtained from a sample of employees within each of the organizations sample; and (5) the surveys should be designed as panel studies.

The survey of "America at Work" called for in this group's report would provide exactly the data needed to support informed policy making and evaluation in this area.

Labor Law

A detailed examination of the relationship between labor law, labor management cooperation, and workplace innovations is provided in another paper being prepared for this Commission and, therefore, we need not discuss these issues in detail here. Instead, we suggest two broad principles for guiding the updating of labor law to promote these innovations.

First, the fundamental principle of labor law--providing individual workers the ability to organize free of coercion on the part of employers or unions must be achieved in practice and perceived to be achieved and fair by workers, union representatives, and managers. At present there is growing evidence that the combination of delay in getting to an election and certifying its results, aggressive employer legal and illegal resistance to organizing efforts, and the difficulty experienced in negotiating first contracts all are frustrating workers and union representatives, undermining confidence in the fairness of the law and its administration, and heightening labor-management tensions. Our reading of the evidence on these matters convinces us that the current law is not adequately implementing this fundamental principle.

Therefore, an updating of labor law and/or its administration is warranted on these grounds alone.

But we have a particular reason for believing that these issues need to be addressed. Union representatives constantly note that their frustration with the current law and its administration is a serious barrier to union support for labor management cooperation and innovation at the workplace. It is politically difficult for union leaders to champion cooperation and innovation in the organized facilities of an employer when they face resistance from the same employer to organizing workers in new or other unorganized facilities. Cooperation in such a case is perceived by workers and union representatives as helping to generate resources through improved performance in the unionized facility that are then siphoned off to grow the nonunion operation(s).

Regardless of how parties in any specific relationship respond to this mixed managerial policy of encouraging worker and union input and cooperation in currently unionized facilities while simultaneously seeking to avoid unions in any new or growing establishments, such a policy has adverse consequences for the macro-economy and society. If played out to an extreme in a dynamic economy where structural change is critical to economic advancement, such as policy will lead to a continuous decline in unionization and ultimately will threaten the institutional security of the labor movement. Support for innovation and cooperation is hardly likely to be forthcoming from any organization that is fighting for survival and is denied legitimacy by the party seeking its cooperation. Thus, fixing the flaws in current labor law is a

necessary, but as we will suggest below, not a sufficient condition for updating labor law to promote workplace innovation.

The second principle that needs to be embedded in an updated labor law suitable for promoting diffusion and institutionalization of workplace innovations is that more flexible forms of participation and representation than those provided under current collective bargaining law need to be explicitly endorsed and encouraged. Current law endorses principles of exclusive representation and bilateral bargaining for the non-supervisory workforce. There are two basic problems with this as the sole form of worker participation/representation encouraged and protected as part of our national labor policy.

The first problem is that the line between supervisory and non-supervisory workers is becoming increasingly blurred as innovations lead to the delegation to rank and file workers or work groups of traditional "supervisory" responsibilities (e.g., scheduling, directing, evaluating employee performance, recommending or authorizing personnel actions such as hiring, promoting, disciplining, and/or terminating employees, etc.). Moreover, by drawing a tight line of demarcation between two classes of employees, a large and perhaps increasing number of supervisors, middle managers, and executives are left with no legal rights to participate or be represented in participatory decision-making processes. Nor can they exercise any legal protection for asserting their interests if they are involved in such processes. Thus, a large number of employees who are critical to the success of workplace innovations are currently legally disenfranchised and unprotected under national labor law.

A second dimension to the problem with current law is that requirement for exclusive representation and duty to bargain to impasse restricts participation and representation to a very specific indirect form -- one that is based on an adversarial set of principles but fails to support cooperative problem solving or to support the range of participatory processes underway in the most innovative employment relationships. Thus, we would favor updating labor law to allow for a variety of non-exclusive participation councils that are broadly representative of the entire hourly, salaried, and managerial workforce and that are encouraged to discuss any human resource issue of mutual concern. These human resource advisory councils should not replace or interfere with exclusive bargaining rights for groups that hold or seek to achieve this status but should serve as a supplement to collective bargaining and exclusive representation.

The primary role of these councils would be to champion and promote the integration of human resource policy into corporate strategies, technology policies, and other long run decisions. As such these bodies would serve as an American version of the works councils found in Germany and several other European countries. Because council membership would be representative of the full range of occupational and functional groups found within an organization, they might also serve an internal grievance and arbitration role for employees who believes their rights have been violated. In this way a minimum level of empowerment would be provided to all employees regardless of whether or not they are formally represented by a union.

Other forms of representation not anticipated by conventional labor law might also be encouraged and endorsed. For example, although employees have gained representation on corporate boards of directors in a small number of unionized U.S. firms as a quid pro quo for wage concessions and/or as part of employee stock ownership programs, neither corporate nor labor law recognize employees as legitimate stakeholders whose vital interests are affected by the issues and decisions normally taken up by board members. Even board members nominated by employees in ESOP companies are bound by their fiduciary responsibilities to shareholder interests which at times can conflict with employee interests. Recognizing employees as stakeholders with legitimate interests in these affairs and providing a role for their articulation at the highest level of corporate decision-making will therefore require reform of both labor law and the legal doctrines controlling corporate governance. The goal of these legal reforms would not be to choose the optimal new institutional form for employee participation. Indeed, this would be a futile exercise given the diverse nature of employment relationships found in today's economy. Instead, the goal is to open up both the law and practice to further experimentation with various means of institutionalizing an on-going commitment to human resource issues in the strategic planning and decision-making and the operational day to day management of American firms.

These proposed changes are part of a debate over the future of American labor law that is just getting under way among scholars and interested practitioners (cf. Kochan, Katz, and McKersie, 1986; Hechscher, 1987; Kochan and McKersie, 1988; Weiler, forthcoming). It is

important to note here that the outcome of this debate will have an important bearing on the prospects for diffusing and institutionalizing the innovations assessed in this report. In short, the need for innovation at the workplace should play a prominent role in these debates.

Integration with other Human Resource and Economic Policies

In the past employee participation specifically, and too often, labor policy in general, have been viewed and debated as stand alone or special interest policy issues and have not been seen as an integral component of national economic, human resource, or social policy. This must change if workplace innovations are to help achieve the steady and continuous improvements in productivity, product quality, and capacity to innovate required for a competitive economy. If the integration hypothesis advanced in this paper is correct, then these micro economic objectives cannot be achieved without the a highly participative, motivated, flexible, and cooperative workforce and labor management relationship. Thus, diffusion of workplace innovations must be viewed as an integral part of the nation's long term economic and human resource strategy and policy.

The work of this Commission offers an important opportunity to join analysis of workplace innovations with planning for other labor market and human resource development policies. Improvements in the quality and performance of education, training, and labor market adjustment institutions are essential to achieving the labor force quality required for the future. The workplace innovations reviewed here are likewise

required to insure that these skills and abilities are fully utilized in organizations of the future.

National Leadership

Finally, diffusion of these innovations is not likely to occur in the absence of strong national leadership and commitment of financial resources needed to build support for and disseminate information about these innovations. Currently, the strongest champions with resources available to support these innovations in the federal government are found in the Department of Labor's Bureau of Labor Management Relations and Cooperative Programs and the Federal Mediation and Conciliation Service program for funding labor management committees under the Labor Management Cooperation Act of 1978. The combined budgets of these two units are less than $10 million. Two changes will be needed to give adequate support to these initiatives.

First, workplace innovations must become a priority of elected and appointed officials across a broader array of government bodies. The President, cabinet members who share responsibility for economic and human resource policy and leaders in Congress need to become champions of these issues if the adversarial tensions between labor and management are to be reversed and top executives are to be convinced that employee participation and labor management cooperation are important national objectives.

Second, financial support for these efforts must be increased substantially from their current levels. Adequate support is unlikely to be forthcoming in the absence of a Congressional mandate and program to

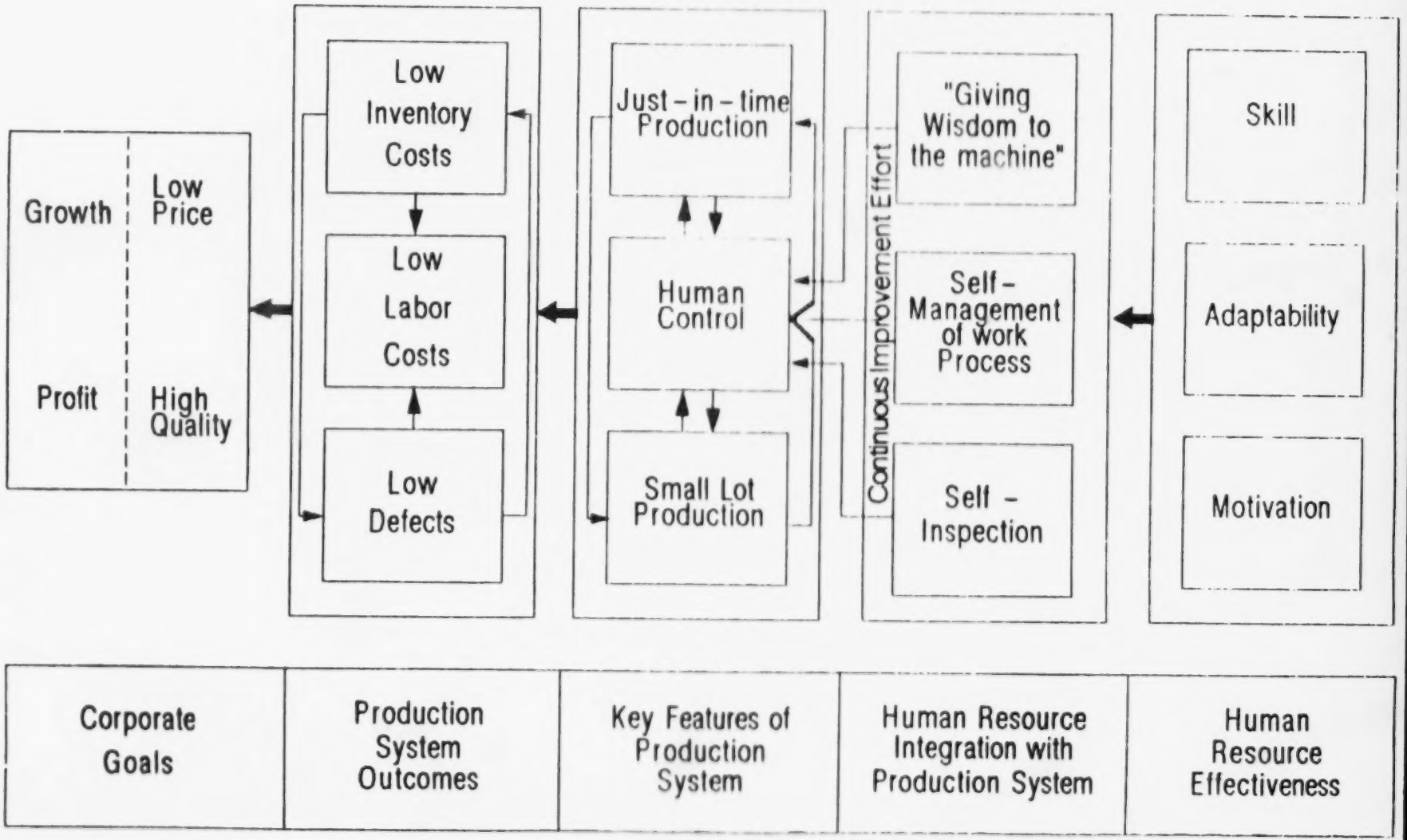
promote further experimentation, evaluation, and diffusion of workplace innovations. Thus changes in current labor legislation or employment policy should include a specific budget and assignment of administrative responsibility for these activities. Further research and dissemination of information and the building of professional networks among individuals experienced in introducing and managing participation and innovation are all necessary components of a national strategy for overcoming the obstacles to workplace innovations and supporting their diffusion and institutionalization.

In the absence of a strong national policy and diffusion strategy we are likely to see significant support for workplace innovations in a limited number of states. A handful of states such as New York, Michigan, Ohio, Wisconsin, and Massachusetts are attempting promote workplace innovations through a variety of efforts. In Michigan, for example state programs support such varied efforts as development and dissemination of new industrial technology suitable for small employers, technical assistance in designing employee participation efforts in small enterprises, direct assistance to community labor- management committees, technical assistance in the design of gain sharing programs and employee ownership, and support for joint labor-management approaches to worker dislocation and employment adjustment, and various programs to create access to venture capital for small or emerging businesses. While such state level initiatives are encouraging, if past patterns of social policy innovation are a guide, only a small number of states are likely to develop such comprehensive efforts. Thus, there is no substitute for a national policy.

Ultimately, America's competitive success will depend in large part on business strategies that emphasize quality and flexibility, which in turn, require an integrated treatment of employee participation, workplace redesign and new technology. Yet knowledge of the need for integration alone is not sufficient to overcome the many social, institutional, and legal barriers that now exist. We believe that a national data base is needed to evaluate the effects of different types of innovation and to track these developments in private practice. In addition changes in national policy and leadership will be needed to diffuse these practices to a broad enough number of employment relationships for them to contribute to our national economic and social welfare.

FIGURE 1

"HUMANWARE": THE JAPANESE MODEL



Source: H.Shimada and J.P. MacDuffie

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REFERENCES

Alper, William S., B. Pfau, and D. Sirota. "The 1985 National Survey of Employee Attitudes Executive Report." Sponsored by Business Week and Sirota and Alaper Associates, September, 1985.

Attewell, Paul. "Big Brother and the Sweatshop: Computer Surveillance in the Automated Office." Sociological Theory 5(1987): 87-99.

Baron, James N., Frank R. Dobbin, and P. Devereaux. "War and Peace: The Evolution of Modern Personnel Administration in U.S. Industry." American Journal of Sociology 92(1986): 350-383.

Blauner, Robert. Alienation and Freedom. Chicago: University of Chicago Press, 1964.

Cammen, Cortlandt, Edward E. Lawler III, Gerald E. Ledford, and Stanley E. Seashore. Management-Labor Cooperation in Quality of Worklife Experiments. Washington, D.C.: U.S. Department of Labor, 1984.

Cappelli, Peter. "Competitive Pressures and Labor Relations in the Airline Industry." Industrial Relations 24(1985): 316-38.

Chalykoff, John. "Computer-Aided Monitoring: Employee Responses to Knowledge of when they are Being Monitored." Conference on Employee Rights and Responsibilities, Virginia Beach, VA, October 13-14, 1988.

Collective Bargaining Forum. New Directions for Labor and Management. Washington, D.C.: U.S. Department of Labor, 1987.

Cuomo Commission Report on Trade and Competitiveness. The Cuomo Commission Report. New York: Simon and Schuster, 1988.

Cusamano, Michael. The Japanese Automobile Industry: Technology and Management at Nissan and Toyota. Cambridge, MA: Harvard University Press, 1985.

Cutcher-Gershenfeld, Joel. "Tracing a Transformation in Industrial Relations: The Case of Xerox Corporation and the Amalgamated Clothing and Textile Workers Union." Washington, D.C.: U.S. Department of Labor, 1988.

Cutcher-Gershenfeld, Joel. "Industrial Relations and Economic Performance: Assessing a Transformation in Labor-Management Relations." Mimeo, Michigan State University, 1988.

Cutcher-Gershenfeld, Joel, Robert McKersie, and Kirsten Wever. "The Changing Role of Union Leaders." Washington, D.C.: U.S. Department of Labor, 1988.

Cutcher-Gershenfeld, Joel, Thomas Kochan, and Anil Verma. "Recent Developments in U.S. Employee Involvement Initiatives: Erosion or Transformation," in Advances in Industrial Relations. Greenwich, CT: JAI Press, forthcoming.

Cutcher-Gershenfeld, Joel, Robert McKersie, and Richard Walton. "Dispute Resolution and the Transformation of U.S. Industrial Relations: A Negotiations Perspective" in Proceedings of the Spring Meetings of the IRRA, 1989. Madison: IRRA (1989).

Cyert , Richard M. and David C. Mowery, (eds). Technology and Employment. Washington, D.C.: National Academy Press, 1986.

Dertouzos, Michael, Robert Solow, and Richard Lester. Made in America. Cambridge: MIT Press, forthcoming.

de Schweinitz, Dorothea. Labor and Management in a Common Enterprise. Cambridge, MA: Harvard University Press, 1949.

Dougherty, Deborah J. "New Products in Old Organizations: The Myth of the Better Mousetrap in Search of the Beaten Path." Ph.D. thesis. Sloan School of Management, M.I.T., 1987.

Douglas, Paul. "Shop Committees: Substitute for, or Supplement to, Trade Unions?" The Journal of Political Economy, (February 1921).

Drago, Robert. "Quality Circle Survival: An Explanatory Analysis." Industrial Relations, 1988.

Emery, Fred and Thorsrud, Einar. Democracy at Work. Leiden, Netherlands: Martinus Nijhoff, 1976.

Ephlin, Donald F. "Revolution by Evolution: The Changing Relationship between GM and the UAW.," In Academy of Management Executive, 2, 1988, 63-66.

Forester, Tom (ed). The Information Technology Revolution. Cambridge, MA: M.I.T. Press, 1980.

Gershenfeld, Walter. "Employee Participation in Firm Decisions." In Human Resources and the Performance of the Firm: IRRA Annual Volume, 1987. Madison, WI: Industrial Relations Research Association, 1987.

Gomberg, William. "Special Study Committees." In John Dunlop and Neil Chamberlain (eds.) Frontiers of Collective Bargaining. New York: Harper and Row, 1967.

Goodman, Paul. Assessing Organizational Change: The Rushton Quality of Work Experiment. New York: Wiley & Sons, 1979.

Hackman, J. Richard. "Sociotechnical Systems Theory: A Commentary." In Van de Van, A. and Joyce, W. (eds.) Perspectives on Organization Design and Behavior. New York: Wiley, 1982.

Hackman, J. Richard and Greg Oldham. Work Redesign. Reading, MA: Addison Wesley, 1980.

Hearings on H.R. 2596 before the Subcommittee on Economic Stabilization of the Committee on Banking, Finance and Urban Affairs of the U.S. House of Representatives, March 24, March 31, and April 5, 1977.

Heckscher, Charles. The New Unionism. New York: Basic [illegible] 987.

Henderson, John C. "Involvement as a Predictor of Performance in I/S Planning and Design." MIT Sloan School of Management Working Paper #88-55, Management in the 1990s Project, 1988.

Hirschorn, Larry. Beyond Mechanization. Cambridge, MA: M.I.T. Press, 1985.

Hulin, Charles and Milton R. Blood. "Job Enlargement, Industrial Differences, and Worker Responses, Psychological Bulletin, 69 (1968): 41-55.

Ichniowski, Casey, David Lewin, and John Delaney. The New Human Resource Management at the Workplace." Paper presented at the First Regional Congress of the Americas, International Industrial Relations Associations, Quebec City, August 24, 1988.

Jacoby, Sanford. "Union-Management Cooperation in the United States: Lessons from the 1920s." In Industrial and Labor Relations Review, Vol. 37, No. 1, October, 1983.

Jacoby, Sanford. Employing Bureaucracy: Managers, Unions, and the Transformation of Work in American Industry. New York: Columbia University Press, 1985.

Kallenberg, Arne. America at Work: National Surveys of Employees and Employers. Report to the U.S. Department of Labor, 1986.

Katz, Harry C., Thomas A. Kochan, and Mark Weber. "Assessing the Effects of Industrial Relations and Quality of Working Life on Organizational Performance." Academy of Management Journal 28(1985): 509-27.

Katz, Harry C., Thomas A. Kochan, and Kenneth Gobeille. "Industrial Relations Performance, Economic Performance, and Quality of Working Life Efforts", Industrial and Labor Relations Review 37(1983): 3-17.

Katz, Harry C., Thomas A. Kochan, and Jeffrey Keefe. "Industrial Relations and Productivity in the U.S. Automobile Industry", Brookings Papers on Economic Activity 3(1988): 685-715.

Klein, Janice. "The Changing Role of First Line Supervisors and Middle Managers." Washington, D.C.: Brookings Institute, 1988.

Kochan, Thomas A. and Peter Cappelli. "The Transformation of the Industrial Relations and Personnel Function." In Osterman, Paul (ed.) Internal Labor Markets., Cambridge, MA: M.I.T. Press, 1984.

Kochan, Thomas A. and Joel Cutcher-Gershenfeld. "Institutionalizing and Diffusing Innovations in Industrial Relations." Washington, DC: U.S. Department of Labor, 1988.

Kochan, Thomas A., Harry C. Katz, and Robert McKersie. The Transformation of American Industrial Relations. New York: Basic Books, 1986.

Kochan, Thomas A., Harry Katz, and Nancy Mower. Worker Participation and American Unions: Threat or Opportunity? Kalamazoo, MI: Upjohn Institute for Employment, 1984.

Kochan, Thomas A. and Robert B. McKersie. "Future Directions for Labor and Human Resource Policy." Paper presented at the first regional conference of the Americas, International Industrial Relations Association, Quebec City, August 24, 1988.

Kochan, Thomas A., Robert B. McKersie, and Peter Cappelli. "Strategic Choice and Industrial Relations Theory." Industrial Relations 23(1984): 16-39.

Kossek, Ellen. "The Acceptance of Human Resource Innovations by Multiple Constituencies." In Personnel Psychology, forthcoming.

Krafcik, John F. "The Triumph of the Lean Production System" Sloan Management Review 30 (1988): 41-52.

Krafcik, John F. and John Paul MacDuffie. "Explaining High Performance Manufacturing: The International Automotive Assembly Plant Study." International Policy Forum, International Motor Vehicle Program, MIT, May 1989.

Lawler, Edward E. and Susan A. Mohrman. "Quality Circles after the Fad." Harvard Business Review 63(1985): 65-71.

Lee, Bruce. "Worker Harmony Makes NUMMI Work." New York Times, December 25, 1988.

Lewin, David, Casey Ichniowski, and John K. Delaney. "Human Resource Policies and Practices and Economic Performance of U.S. Business." Annual Meeting IRRA, December, 1988, New York City.

Lewin, Kurt. Resolving Social Conflict: Selected Papers on Group Dynamics. New York: Harper, 1948.

Loveman, Gary W. "An Assessment of the Productivity Impact of Information Technology." MIT Sloan School of Management Working Paper #1988-054, Management in the 1900s Project, 1988.

MacDuffie, John Paul and Thomas Kochan. "Human Resources, Technology, and Economic Performance: Evidence from the Automobile Industry", paper delivered at Annual Meeting of Industrial Relations Research Association, December 28, 1988, New York.

Mahoney, Thomas A. "From American to Japanese Management: The Conversion of a Tire Plant." Owen Graduate School of Management, Vanderbilt University, Working Paper #88-14, 1988.

Mansfield, Edwin. The Economics of Technological Change. New York: Norton Press, 1968.

Marshall, Ray. Unheard Voices. New York: Basic Books, 1987.

Nelson, Richard, R. and Sidney G. Winter. An Evolutionary Theory of Economic Change. Cambridge, MA: Harvard University Press, 1982.

New York Stock Exchange. People and Productivity: A Challenge to Corporate America. New York: New York Stock Exchange, 1982.

Parker, Michael and Jane Slaughter. Choosing Sides. Boston, MA: South End Press.

Piore, Michael and Charles Sabel. The Second Industrial Divide. New York: Basic Books, 1984.

President's Commission on Industrial Competitiveness. Global Competition: The New Reality. Washington, D.C.: Government Printing Office, 1985.

Roach, Suzanne S. America's Technology Dilemma: A Profile of the Information Economy. Morgan Stanley Special Economy Study, New York, 1987.

Roethlisberger, Fritz. Management and Morale. Cambridge, MA: Harvard University Press, 1941.

Rosenberg, R. and E. Rosenstein. "Participation and Productivity: An Empirical Study." In Industrial and Labor Relations Review, Vol. 33, No. 3, April, 1980.

Schwab, Donald P. and Larry L. Cummings. "Theories of Performance and Satisfaction: A Review." Industrial Relations, 9 (1970): 408-30.

Shimada, Haruo and MacDuffie, John Paul. (1986). "Industrial Relations and 'Humanware': Japanese Investments in Automobile Manufacturing in the United States." Working Paper, Sloan School of Management, M.I.T., 1986.

Thomas, Robert J. "Technological Choice: Obstacles and Opportunities for Union-Management Consultation on New Technology," MIT Sloan School of Management Working Paper #1987-88, 1988.

Trist, Eric. "The Evolution of Socio-Technical Systems as a Conceptual Framework and as an Action Research Program." In Van de Van, A. and Joyce, W. (eds.) Perspectives on Organization Design and Behavior. New York: Wiley, (1981): 19-75.

Trist, Eric. and K. Bamforth. "Some Social and Psychological Consequences of the Longwall Method of Coal-getting." Human Relations 4(1951): 6-38.

Walton, Richard E. "The Diffusion of New Work Structures: Explaining Why Success Didn't Take", Organizational Dynamics (Winter 1975): 3-22.

Walton, Richard E. "Establishing and Maintaining High Commitment Work Systems." In The Organizational Life Cycle. Kimberly and Miles (ed.) San Francisco: Jossey-Bass, 1980.

Walton, Richard E. Innovating to Compete. San Francisco: Jossey-Bass, 1987.

Walton, Richard E. and Robert McKersie. A Behavioral Theory of Labor Negotiations. New York: McGraw-Hill Book Company, 1965.

Walton, Richard E. "Social Choice and Development of Advanced Information Technology." Human Relations 12 (1982), 1073-84.

Weiler, Paul. The Law at Work: Past and Future of Labor and Employment Law. Draft Manuscript, Harvard University Law School, forthcoming.

Whyte, William F. Worker Participation and Ownership: Cooperative Strategies for Strengthening Local Economies. Ithaca, NY: ILR Press, 1983.

Witte, John. Democracy, Authority and Alienation in Work. Chicago: University of Chicago Press, 1980.